In the claims

1	Cancel claims 1-43.
2	Claims 44-53 remain in the application.
1	44. A method of making a magnetic head assembly having a read head and a writ
2	head comprising the steps of:
3	a forming of the write head comprising the steps of:
4	forming ferromagnetic first and second pole piece layers with a yoke portion
5	between a pole tip portion and a back gap portion;
6	forming a nonmagnetic write gap layer between the pole tip portions of the first
7	and second pole piece layers;
8	forming an insulation stack with at least one coil layer embedded therein in th
9	yoke portions of the first and second pole piece layers; and
10	connecting the first and second pole piece layers at their back gaps portions;
11	a forming of the read head comprising the steps of:
12	forming nonmagnetic nonconductive first and second read gap layers;
13	forming a dual spin valve sensor between the first and second read gap layers;
14	forming a ferromagnetic first shield layer; and
15	forming the first and second read gap layers between the first shield layer and th
16	first pole piece layer;
17	a making of the dual spin valve sensor comprising the steps of:
18	forming first and second pinned layer structures wherein each pinned layer
19	structure has a magnetic moment;
20	forming antiferromagnetic first and second pinning layers exchange coupled t
21	the first and second pinned layer structures for pinning the magnetic moment of the first
22	and second pinned layers respectively;
23	forming an antiparallel (AP) coupled free layer structure between the first an
24	second pinned layer structures with a magnetic moment; and
25	forming a nonmagnetic conductive first spacer layer between the first pinne
26	layer structure and the AP coupled free layer structure and a nonmagnetic conductive
27	second spacer layer between the second pinned layer structure and the AP coupled fre
28	layer structure; and
29	a making of the AP coupled free layer structure including the steps of:

30	forming ferromagnetic first, second and third antiparallel (AP) coupled
31	free layers; and
32	forming a first antiparallel (AP) coupling layer between the first and second AP
33	coupled free layers and a second antiparallel (AP) coupling layer between the second and
34	third AP free layers.
1	45. A method as claimed in claim 44 further comprising the steps of:
2	forming a ferromagnetic second shield layer between the second read gap layer and the
3	first pole piece layer; and
4	forming a nonmagnetic separation layer between the second shield layer the first pole
5	piece layer.
1	46. A method as claimed in claim 44 as claimed in claim wherein the first and third
2	AP coupled free layers are formed of a cobalt based material and the second AP coupled free
3	layer is formed of a nickel iron based material.
1	47. A method as claimed in claim 46 wherein the second AP coupled free layer is
2	formed with a magnetic thickness that is greater than a net magnetic thickness of the first and
3	third AP coupled free layers.
J	ulitu At Coupled free layers.
1	48. A method as claimed in claim 47 wherein the magnetic thicknesses of the first and
2	third AP coupled free layers are equal.
1	49. A method as claimed in claim 48 wherein the materials of the first and second
2	pinning layers are the same.
-	planing layors are the same.
1	50. A method as claimed in claim 49 wherein the first pinned layer structure is a
2	double antiparallel (AP) pinned layer structure that is formed comprising the steps of:
3	forming ferromagnetic first and second antiparallel (AP) coupled pinned layers; and
4	forming an antiparallel (AP) coupling layer between and interfacing the first and second
5	AD ninned layers

1	51. A method as claimed in claim 50 wherein the second pinned layer is a triple
2	antiparallel (AP) pinned layer structure that is made comprising the steps of:
3	forming ferromagnetic first, second and third antiparallel (AP) coupled pinned layers; and
4	forming a nonmagnetic first antiparallel (AP) coupling layer between and interfacing the
5	first and second AP pinned layers and forming a nonmagnetic second antiparallel (AP) coupling
6	layer between and interfacing the second and third AP pinned layers.
1	52. A method as claimed in claim 51 wherein the double AP pinned layer structure is
2	formed with a net magnetic moment that is equal to a net magnetic moment of the triple AP
3	pinned layer structure.
1	53. A method as claimed in claim 52 wherein:

ferromagnetic coupling field with respect to the free layer structure; and

2

4 5

are equal.

each of the double and the triple AP pinned layer structures is formed with a

the ferromagnetic coupling fields of the double and the triple AP pinned layer structures